Space Weather Forecast

Issued on Monday, 08 August 2022 at 13:05 Local

This forecast provides a four-day assessment of space weather events. The probabilities stated below are for reaching or exceeding the given levels. For more information about space weather impacts please see the Met Office Space Weather Scales https://www.metoffice.gov.uk/weather/learn-about/space-weather/uk-scales

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Space Weather Forecast Headline: Further Minor Geomagnetic Storms likely through midweek.

Analysis of Space Weather Activity over past 24 hours

Solar Activity: Solar activity has been low over the past 24 hours, with isolated low-end common class flares peaking around 07/2306UTC from a departing sunspot group. This was one of up to seven sunspot regions on the facing side, with all of these either simple magnetically unipolar groups, else simple bipolar groups. The only growth in any spot group was tied to the emergence of a small sunspot region near the middle of the Sun, however this development was not capped by flare activity.

The main activity in the past 24-30 hours has been the movement and potential disappearance of up to four 'filaments' (arcs of plasma) - mainly in the eastern solar hemisphere. In order, these have been: a southeastern quarter filament at 07/1000UTC; a northeast at 07/1200UTC; a larger event at 07/1900UTC that straddled both hemispheres; and finally a small northern solar hemisphere event that straddled the solar meridian. At the time of writing, there is no clear evidence that any of these have any Earth-bound component, nor can they all be accounted for on imagery, however this is an active area of analysis.

No Earth-bound Coronal Mass Ejections (CMEs) are yet in evidence.

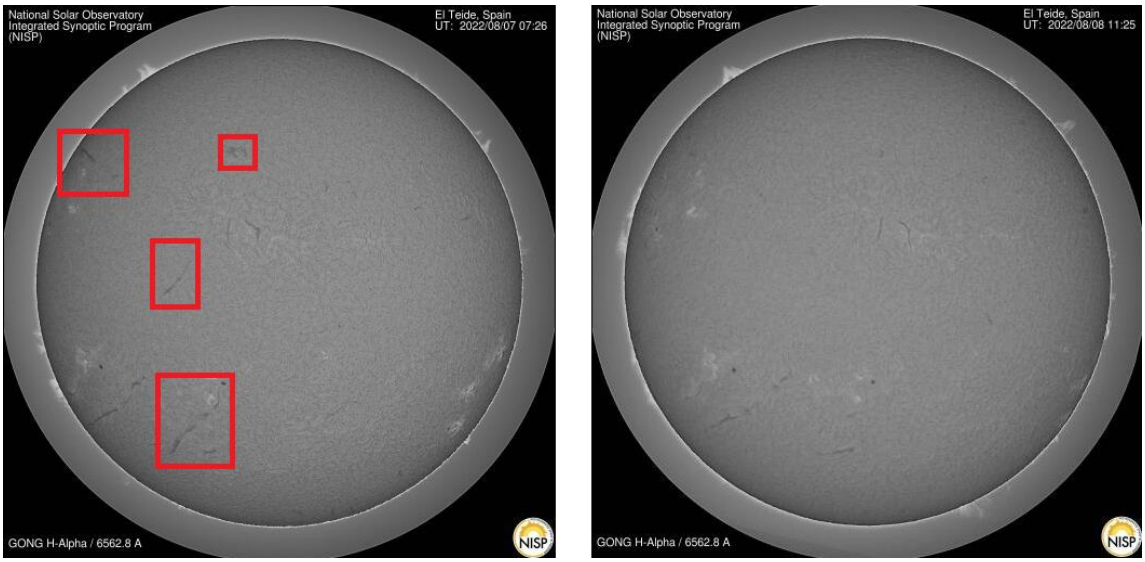

Figure 1: Ground-based near infrared imagery of up to four disappearing 'filaments' (arcs of plasma) during and shortly preceding the 24-hour forecast period (before and after disappearance). At the time of writing, none were confirmed as being Earth-directed, but this is under review and not all are accounted for.

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Solar Wind / Geomagnetic Activity: Earth is currently under the influence of the fast wind from a 'coronal hole'. The most likely culprit is considered to be a small feature visible in extreme UV imagery near the northwestern solar horizon.

The solar wind was characteristic of an elevated fast wind, with the solar wind speed rising in earnest from the UTC evening of 07 August. The number of particles comprising the wind was highest early in the period, later waning through the onset of the fast wind regime proper. The magnetic field associated with these particles was slightly elevated for much of the period and erratic in character, finally abating a little into a more typical range to end the period. The north-south component meanwhile was similarly volatile, being alternately aligned and anti-aligned with Earth's field to lesser and greater effect (respectively).

The net result of the above solar wind measures was a period of heightened geomagnetic activity, with Lerwick magnetometer in particular showing some disturbance, with a roughly 350nT change in the H-component in the 15 minutes following 07/2357UTC. This was less pronounced at magnetometers further south, but did mean two successive intervals of local K7 at Lerwick that straddled midnight UTC.

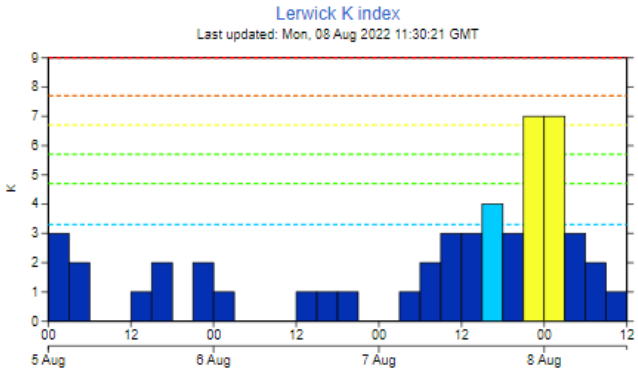

Figure 2: Lerwick observatory local K measurements, showing marked response to onset of a coronal hole high speed stream with local 7s recorded. Kp at this time was 5, which corresponds to a G1 Minor Geomagnetic Storm.

The provisional Kp was Unsettled to Minor Storm G1 throughout, with late revisions in the provisional data giving up to four consecutive G1 intervals 21-09UTC, with the peak being in the 21-24UTC and 00-03UTC intervals.

Energetic Particles / Solar Radiation: No solar radiation storms were observed.

Four-Day Space Weather Forecast Summary

Solar Activity: Low or very low solar activity is forecast, with a decreasing Slight Chance of an isolated M-class flare.

Solar Wind / Geomagnetic Activity: No CMEs feature in the current forecast.

Solar winds are forecast to be elevated - perhaps peaking at strong - due to a succession of up to three high speed streams. The third of these has only recently appeared and may not manifest at Earth, and in any case transition between all of these features may be indistinct.

Geomagnetic activity is now thought likely to carry a more prolonged risk of minor Geomagnetic Storm G1 through midweek as a result of the succession of fast wind streams. Solar winds may

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remain slightly elevated later this working week, however the threat of further G1 intervals should recede as the features mature.

Energetic Particles / Solar Radiation: No solar radiation storms are expected.

Geomagnetic Storms:

Geo-Magnetic Storm Probability (Exceedance)	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Minor or Moderate	G1 to G2	Yes	60	60	30	1
Strong	G3	No	10	10	1	1
Severe	G4	No	1	1	1	1
Extreme	G5	No	1	1	1	1

Radio Blackouts - X Ray Flares:

X Ray Flares Probability	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Active	R1-R2 M Class	No	5	1	1	1
Very Active	R3 to R5 X	No	1	1	1	1

Solar Radiation Storms - (High Energy Protons):

Radiation Storms Probability (Exceedance)	Level (cm^{-2} sr^{-1} s^{-1})	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Active	≥ S1	No	1	1	1	1
Very Active	≥ S3 *	No	1	1	1	1
* S3 ≥ 10 MeV ≥ 1000 pfu and / or ≥ 50 MeV ≥ 10 pfu. (pfu = $cm^{-2}sr^{-1}s^{-1}$)						

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